Federal Democratic Republic of Ethiopia

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ET 1204 (2005) (English): Beehives - Specification

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ETHIOPIAN STANDARD

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Beehives - Specification

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Foreword

This Ethiopian Standard has been prepared under the direction of the Agriculture and Food Technology Technical Committee and published by the Quality and Standards Authority of Ethiopia (QSAE).

In the preparation of this Ethiopian Standard references have been made to the following.

- Indian Standard 1515-1998, “Specification for beehives”.
- SBA Technical Data sheet Number OS The longstroth and M.D. Hives
- Small scale beekeeping, Kenya-top-Bar hive

Acknowledgement is made for the use of information from the above publications.

Beehive - Specification

1 SCOPE

This Ethiopian Standard prescribes the requirements including dimensions for beehive and its parts.

2 Normative reference

The following Ethiopian Standard contains provisions, which through reference to this text constitute provisions of this Ethiopian Standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and possibility of applying the most recent editions of the Ethiopian Standard indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES 95:1990 Nail Steel wire nails – specification.

3 Definitions

For the purpose of this committee draft, the following definitions shall apply.

3.1
bee Space
the optimum distance between two surfaces in a beehive essential for the normal movement and functioning of bees

3.2
brood chamber
a four-sided wooden box of rectangular cross-section without a top or a bottom, in which the brood frames are placed.

3.3
brood frame
a frame made up of a top bar, a bottom bar and two sidebars in which the bees develop comb to rear brood.

3.4
crown board (inner cover)

a partition between the super chamber and the roof (top).

3.5
division board

A wooden board slightly larger than the brood frame and placed the brood chamber to prevent the bees from going beyond it, thus uniting the capacity of the brood chamber.

3.6
dummy board

a wooden board equal in outside length and height dimensions to the brood frame. This is used in weak and developing colonies at the end of brood frame.

3.7
entrance Gate

a wooden block at the hive entrance usually provided with slots of suitable size.

3.8
floor board

a wooden board on which the brood chamber rests.

3.9
frame

a frame of wood, of suitable size, to hold a comb. [The frames are so constructed that a series of them may be placed in a vertical position in the brood chamber or the super chamber so as to leave space (bee space) in between them for bees to move].

3.10
queen excluder sheet
a set of openings meant for restricting the movement of the queen.

3.11
Queen Gate
a provision made on the entrance gate by a queen excluder sheet for preventing queen from going out and also enemies like wasps from entering.

3.12
reinforcement

a wire parallel to the top bar and attached to the sides of frames to reinforce the comb foundation.

3.13
roof (top)

a wooden cover with four sides and a top and placed on the super chamber.

3.14
super chamber
- a four-sided wooden box of rectangular cross-section without a top or a bottom in which the super frame is placed. It is similar to the brood chamber but of lesser height and placed above it when in use.

3.15
super frame
a frame which has a depth less than that of the brood frame and in which surplus honey is stored.

4 Types and sizes of beehives

4.1 There shall be three types of beehives, namely

4.1.1 Top bar, Hives (intermediate)
4.1.2 Zander, Hives (modified)
4.1.3 Langsthroth beehives

4.2 The dimensions for different parts shall be with a minimum of 20 mm wall plank thickness.

5 General requirements

5.1 Description

5.1.1 Bottom board

At the very bottom of each hive, resting on whatever is used to raise the hive off the ground. It has a ledge around three sides that raises the first broad chamber leaving an open slit in the front, which is the primary entrance of the hive.

5.1.2 Brood chamber

A broad chamber is a super or rectangular box filled with frames, in which the queen has allowed to lay eggs. Cells in which eggs have been laid are called broad cells young bees emerged from their cells are called broad. Young bees in honey are not required so the queen is permitted only in this portion of the hive.

5.1.3 Frames

Hanging inside each super. It is on the frames that we want to build the wax comb in which they will raise broad and store honey, pollen, and royal jelly. New frames usually contain foundation, which is a thin sheet of bees wax with hexagon pattern pressed into it.

5.1.4 Honey Supers

A honey super is exactly the same as broad chamber or broad super. The only difference is that a queen excluder is used to prevent the queen from laying in the honey supers.

5.1.5 Queen Excluder

A queen exclude is a metal or plastic grill with bars, or holes spaced just for enough apart that the worker bees can pass through them but queen bee can not.

5.1.6 Inside Cover

A flat board placed on top of upper most super. There is a shallow rim around the under side of the inside cover with hole in the front just big enough for bees to pass through. This allows air to move in and out of the hive.

5.1.7 Out side covers (Roof)

The out side cover is wider than the rest of the hive providing a bit of an overhang so that water drips beside the hive rather than running down the side of the hive or possibly into the hive outside cover is covered by a sheet of metal.

5.1.8 Dimensions

All dimensions stated in this specification shall be regarded as finished dimensions and shall be measured after the completion of finishing operations, such as, planning and sand papering.

5.1.9 Finish

The different parts of the beehives shall have a smooth finish with the edges trimmed square and smooth. Parts of the beehive exposed directly to weather shall be painted with a suitable protective paint. The paint shall be non-toxic and shall not have any odour disagreeable to the bees. The colour of the paint shall be white, yellow, green or gray.

5.1.10 joints

All joints shall be sound and shall withstand normal use. For all types of beehives walls of chambers and roofs shall be jointed by special box corner joints, finger joints, dovetail joints or tongue and groove joints properly nailed.

When the use of nails for joints is specified, there shall be one nail at each end. The distance between tow consecutive nails shall be not more than 75mm.

5.1.11 Nails

The nails used shall conform to ES 95.1990 steel wire nails-specification

5.1.12 Reinforcement

The wire used for reinforcement shall be galvanized mild steel wire of diameter 0.400 mm and shall be suitably anchored in the sidebars by nails.

5.1.13 Wood

Only well-seasoned timber shall be used. Unless specified otherwise, the thickness of the wood used shall be 20mm, and it shall be freeform checks, decay, insect-holes, dead knots, shakes and splits. Hair checks, and live knots, not exceeding one-quarter of the width of wood, shall be permitted. The slope of the grain shall not be more than one in eight.

6 . Essential parts of beehives

6.1 The beehive shall consist the following parts.

6.1.1 Floor board (with entrance gate),

6.1.2 Brood chamber (with brood frame),

6.1.3 Super chamber (with super frames),

6.1.4 Inner cover (crown board), and

6.1.5 Roof (top)

7 . Requirements and dimensions for bee hives

7.1 Zander hives (modified)

7.1.1 Floor board

The floorboard shall be made of well-seasoned 20mm wood or appropriate material, which is not objectionable to bees with a thickness of 20mm. The dimension of floorboard shall be as given in Table 1 and the attached design. If it is made by using more than one piece of wood, the pieces shall be joined by tongue and groove joints and it shall be fixed to the broad chamber.

7.1.1.1 Entrance gate

An open slit left on the broad chamber with the dimension of 100 to 150mm wide and 15mm deep. It shall have a sliding shutter, which reduces the size of the opening to 100mm during the cold season. The entrance get shall also be provided with bee landing plat form rigidly fixed or hinged. All dimensions shall be as given in Table 1 and the attached design.

7.1.2 Brood chamber

The dimensions of the brood chambers shall be as given in Table 1. There shall be 10mm wide and 16 mm deep cut in the front and back walls of the broad chamber, so that frames shall rest on these cut. The four sides of the chamber shall be joined by box corner, finger, dovetail or tongue and groove joints.

7.1.3 Super chamber

The dimensions of the super chamber shall be as given it Table 1 and the attached design. It shall be made of wood or plastic or foam material 20mm thick. There shall be 10mm wide and 16mm deep cut in the front and back walls of the super chamber. The frames shall rest on these cut walls. There shall be out side support strips 495mm long at the front and rear side and 545mm at left and right side and 40mm wide. on all four sides of the outer faces of the side walls for lifting or to protect slipping off the hive parts from any mechanical shake. The four sides of the chamber shall be joined by special box corners, fingers, dovetail or tongue and groove joints.

7.1.4 Roof or Top cover

The dimensions of the top cover shall be as given in Table 1. It shall be made of plywood or not more than three pieces of wood. The wall shall be 20 mm thick. It shall be fixed to the walls with nails conforming to ES 95.1990. The roof shall be suitably covered with a sheet of metal to protect against rain. The sheet shall extend 30mm down below the top edge of the roof board. The roof shall be made flat.

7.1.5 Frames

The dimensions of the frame shall be as given in Table 1. The top bar shall extend equally on both sides of the frame. A frame shall have top bar, two sidebars and bottom bar conforming the description given below.

7.1.5.1 Top bar

The top bar shall be 20 mm wide 20 mm thick and 478 mm in length. It shall be made of well-seasoned wood. Preferably the ends of the side shall be joined to the top bar by tongue and groove joints.

7.1.5.2 Side bars

The sidebars may preferably be of shoulder type or with separate bee-spacer. It shall be 20 mm thick 20 mm wide at the end and 35 mm wide at the top to provide 10mm bee space. Four holes for wire reinforcement shall be made at a distance of 40 mm from the top of the side bar. Alternatively, keeping the width of the side bar as 20mm separate wooden, plastic or metal bee space may be fixed to the sidebars. This would ensure greater accuracy in bee space between two frames and automatically adjust distance between the centers of the two adjacent frames.

7.1.5.3 Bottom bars

The bottom bar shall be 20 mm wide, 20 mm thick and 440 mm in length. It shall be made of well-seasoned wood.

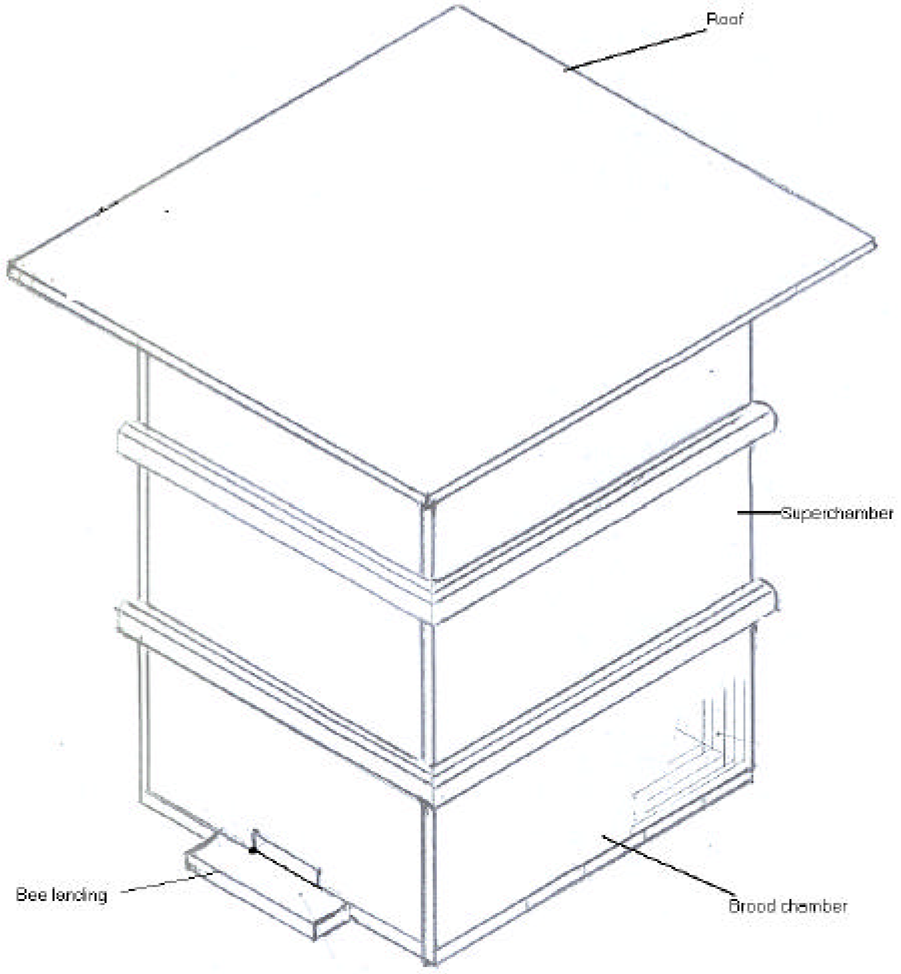
7.1.6 Queen exclude

The Queen excluder shall be made of parallel wire mounts of a perforated plate of rust proof metal such as, zinc or aluminum of not less than 1.25 mm thickness or plastic material, which is not objectionable to bees. The width of the openings or slots in the queen excluder shall be 4.03 mm. the maximum length of the openings or slots shall be 20mm.

Table 1. Dimensions of various parts of Zander type hives (modified).

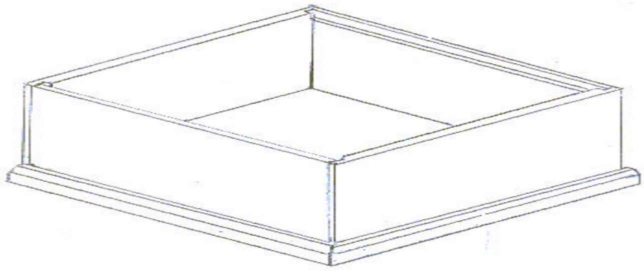
	Length in mm	Width in mm	Height in mm
Floor board	460	460	20
Brood chamber			
external	500	460	245
internal	460	420	-
Super chamber			
External	500	460	245
Internal	460	420	
Frames			
External	440	-	230
Internal	400	-	190
Roof (top)			
External	700	660	35

Zander hive(Modified)

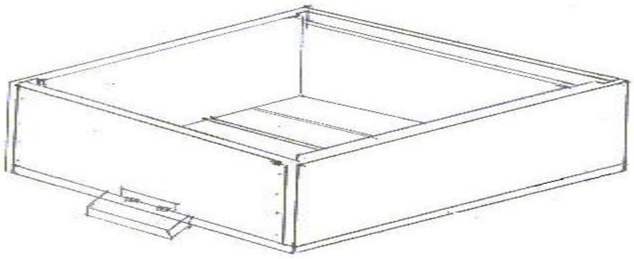


ZANDER HIVE(MODIFIED)

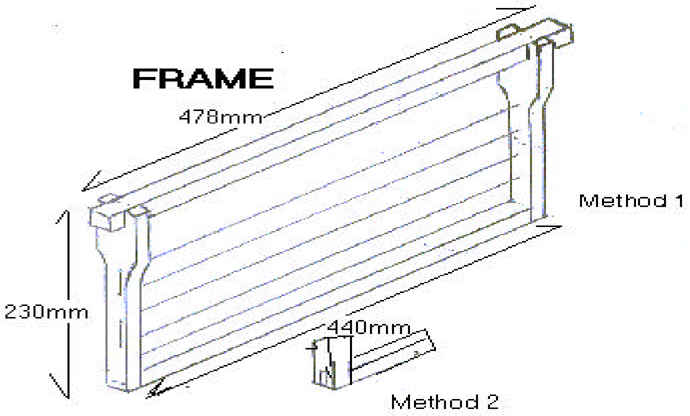
SUPER CHAMBER



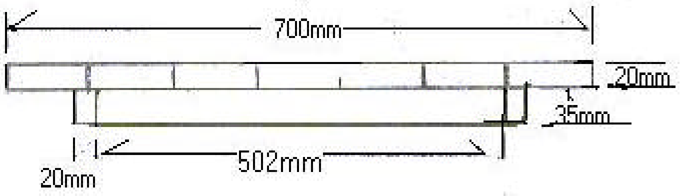
BROOD CHAMBER

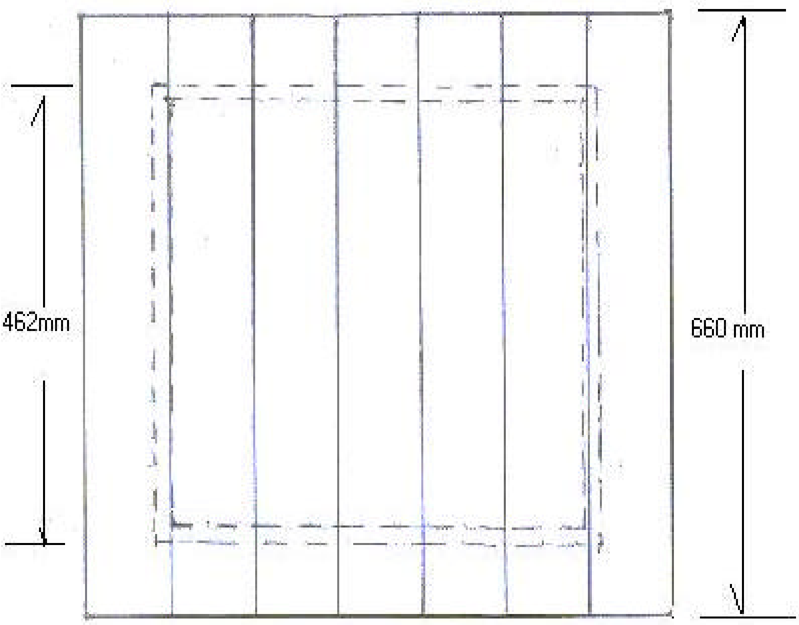


FRAME

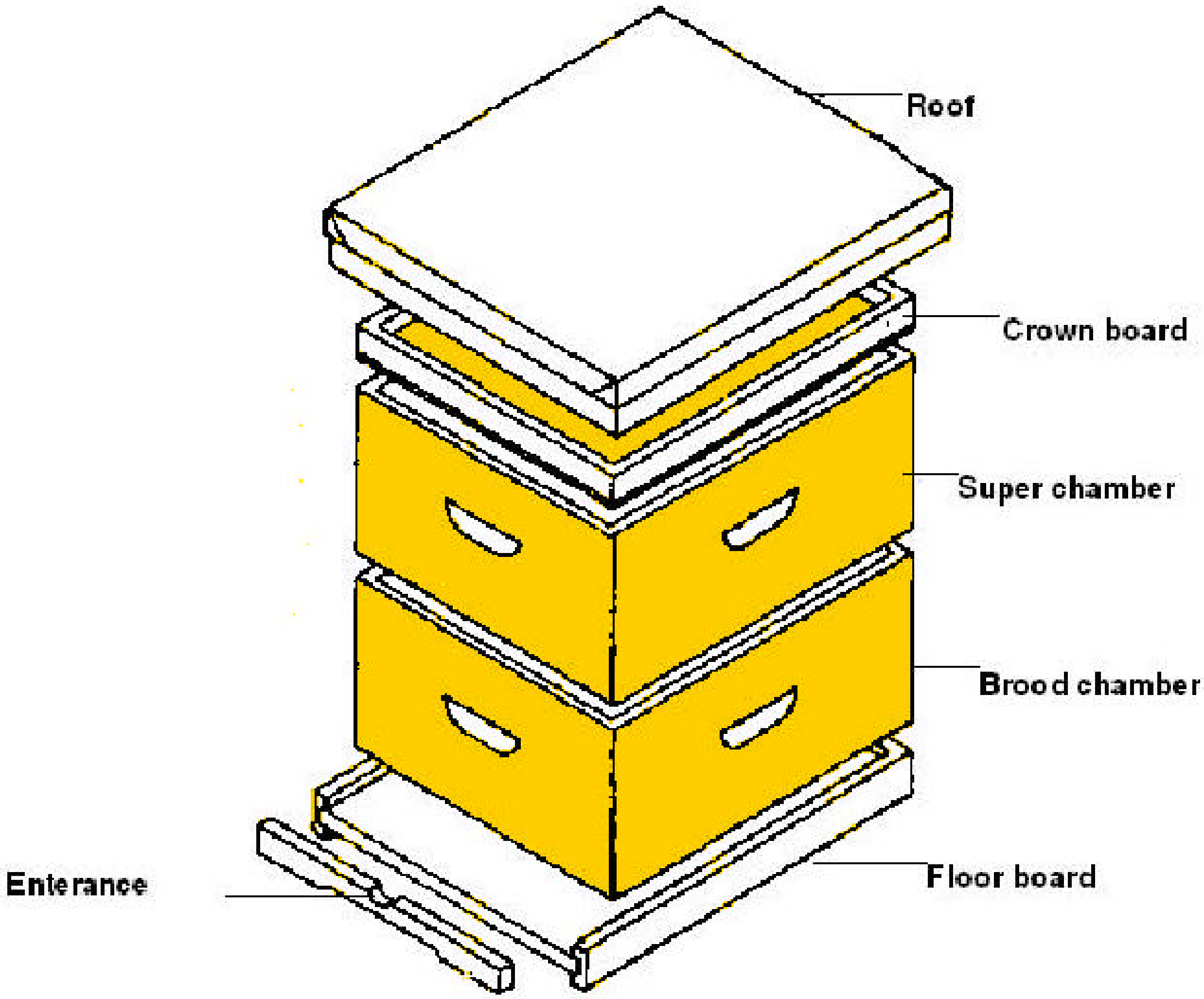

478mm
230mm
440mm
Method 1
Method 2

ROOF


700mm
20mm
35mm
502mm
20mm


462mm
660 mm

Langstroth Hive



7.2 Longstroth Hive

7.2.1 Floor and Entrance

a) The floorboard shall be made of 20 mm thick well-seasoned wood or foam material. The dimensions shall be as given in Table 2. If using more than one piece of wood makes it the pieces shall be joined by tongue and groove joints.

b) External dimensions shall be 413 mm wide and 508 mm long.

c) Floorboard shall be 19 mm thick wood tongued and grooved or lapped joints 381mm long and convenient widths to make up to 508 mm.

d) Wood grooved shall be 10 mm deep into side rails 508 mm long 50.8 mm deep and 22 mm thick.

e) The grooves shall be 19 mm wide, 10 mm from one edge and 22mm from the other edge.

f) Back rails shall be 368 mm x 22 mm x 22 mm for the deep side and 368 mm x 22 mm x 10 mm for the shallow side, shall be nailed on at opposite ends.

g) The entrance get is only used when the floor has its deeper side uppermost.

h) It is a fraction under 22 mm square cross section and 365 mm long, with 150 mm x 15 mm central cut-away on one face. This allows it to be used to either regulate the entrance get to 150 mm wide or to close off the entrance completely.

i) Fix into the inner face of the rail on each side at the front of the floor 22 mm in from the front and leaving about 10 mm of the strip projecting. This will prevent the block being accidentally pushed into the hive and out of reach.

j) Floorboard shall be fit into the grooves of the side rails. Nail in from the out side of the side rails. Nail on the back strips, one on each side and at opposite ends, with nails in at both ends.

7.2.2 Brood Chamber

The dimensions of the brood chamber shall be as given in Table 2. The four sides of the brood chamber shall be joined by special box corner or finger or dovetail or tongue and groove joints.

External dimensions shall be 508 mm long, 413mm wide and 244 mm deep constructed from four pieces of minimum 20 mm thick wood or foam material, which is not objectionable to bees.

Internal dimension shall be 463 mm long and 368 mm wide end walls rebated at the top 10 mm wide and 16 mm deep in the front and back walls of the brood chamber. The brood frames shall rest on these rebated walls. There shall be grooves or notches on two opposite outer surfaces of the sidewalls for lifting the brood chamber. Preferably cut all the wood to size and cut or fix the finger grips in the outer faces. Form the box by nailing (and glueing also if desired) at the four corners.

7.2.3 Super chamber

The dimensions shall be as given in Table 2. External dimension shall be 508 mm long, 413 mm wide and 146 mm deep. A rebated 10mm wide and 16 mm deep shall be cut in the front and back walls of the super chamber. Super frames shall rest on these rebated walls. There shall be grooves or notches on two opposite outer faces of the sidewalls for lifting the super chamber. The four sides of the chamber shall be joined by special box corners or fingers, dovetail or tongue and groove joints.

7.2.4 Roof

The dimensions of the roof shall be as given in Table 2. The walls shall be 18 to 20 mm thick. Generally the parts that form the skirt are of 18 mm or 19 mm thickness, but 12mm plywood can also be used. The size of the roof shall be such that there is adequate clearance between the inner faces of the skirt and the outer faces of the hive boxes. The four walls shall be joined by dovetail or tongue and groove joints.

Four supporting strips of wood measuring 35 mm x 20 mm cross-section are fixed around the top inside to give a head space of 36 mm minimum above the crown board.

Assemble the four sides of the roof tacking care to nail the corners in both directions, then fit the top boards, nailing them through onto the side boards along all four sides, Next fit the four strips to provide the head space, then cover with water proof cover or stainless steel sheet.

Instead of deep roof, shallow roof may also be used. The thickness of the wall and the roof board, length, breadth of the shallow roof shall be the same as given in Table 2. The roof board shall be suitably covered with a metal sheet extending 30mm down below the edge of the roof board.

7.2.5 Inner cover/crown board/

The dimensions of the inner cover shall be as given in Table 2. The inner plank shall be 15 mm thick. on one of the sides of the plank 22 mm wide 10mm thick strip, shall be fixed on the upper side only. In the center the inner cover shall have an opening of 100 x 50 mm to receive a porter bee escape.

Form the board from plywood and then cut and fir the escape before fitting the framing to the outer edges.

7.2.6 Brood frame

7.2.6.1 Over all dimensions of frame shall be as given in Table 2. The top bar shall extend equally on both sides of the frame.

7.2.6.2 Form of frame

The frame shall have the top bar two sidebars and bottom bar conforming the description given in sub section7.2.6.3, 7.2.6.4 and 7.2.6.5 respectively

7.2.6.3 Top bar

The top bar shall be 25 mm wide 10 mm thick and 448 mm in length. The ends of the top bar may be tapered, if needed. The ends of the side bar shall be joined to the top bar by tongue and groove joints.

7.2.6.4 Side bar

The side bar may preferably be of shoulder type or with separate bee spacer. It shall be 10 mm thick 25 wide at the bottom and 32 mm wide at the top to provide the bee space specified. Two hole for wire reinforcement shall be provided. Alternatively keeping the width of the side bar 35 mm separate plastic spacer may be fixed to the side bars. This will ensure greater accuracy in bee space between two frames and automatically adjust distance between the centers of the two adjacent frames.

7.2.6.5 Bottom bar

Bottom bars shall be 15 mm wide 10 mm thick and 232mm in length preferably the ends shall have a groove to fit in the tongue of the side bar.

7.2.7 Super frame

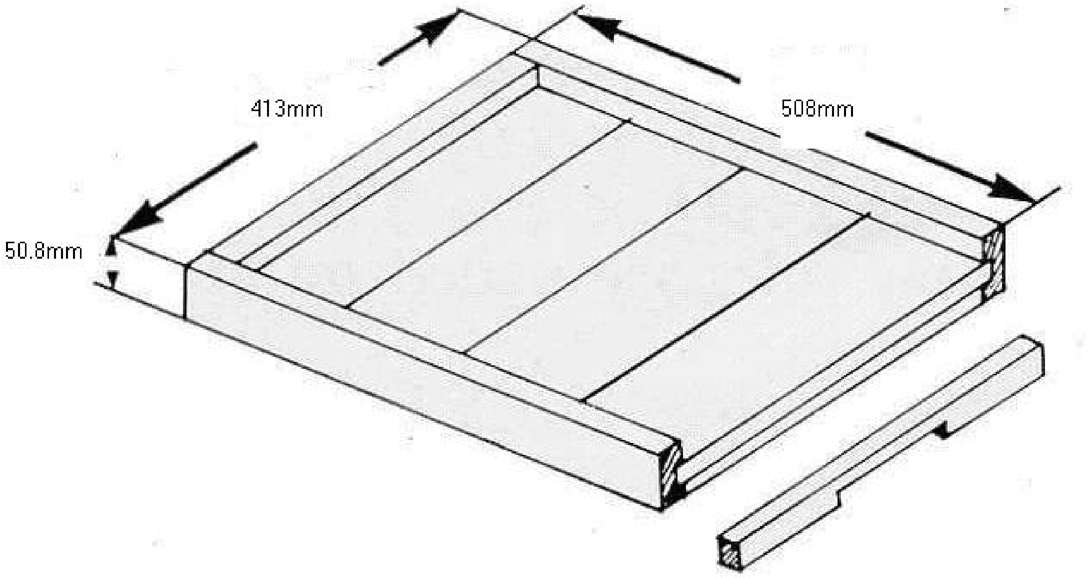
The dimensions of the super frame shall be as given in Table 2. The dimensions of the super frame shall be as given in Table 2. The top bar shall extend equally on both sides of the frame. Except the depth of the frame, the dimensions of super frame are identical to brood frame.

7.2.8 Queen Excluder

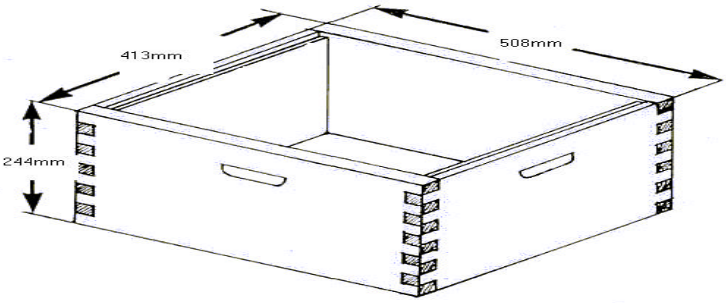
The queen excluder shall be made of parallel wire mounts of a perforated plate of rust proof metal, such as zinc or aluminum of not less than 1.25mm thickness. The width of the openings or slots in the queen excluder shall be 4.03 mm the maximum length of the openings or slots shall be 20 mm.

Table 2 Dimensions of various parts of longstroth hive

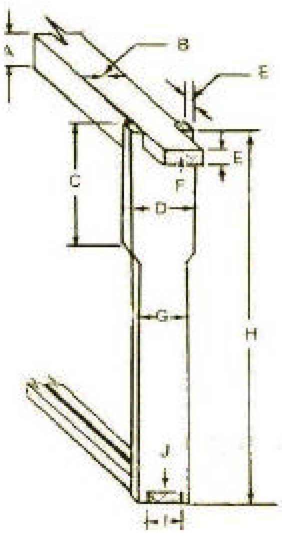
	Length in mm	Width in mm	Height in mm
Floor board			
External	508	413	51
Broad chamber			
external	508	413	244
internal	463	368	244
Super chamber			
External	508	413	146
Internal	463	368	146
Brood frame			
External	448	-	232
Internal	428	-	212
Super frame			
External	448	-	136
Internal	428	-	116
Roof (top)			
External	524	429	156



Floor and entrance block

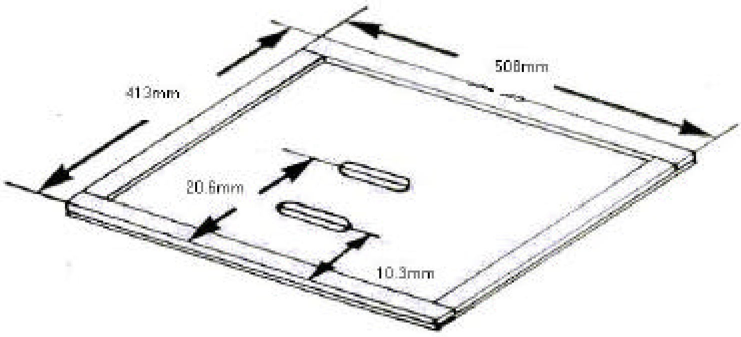


BROOD CHAMBER

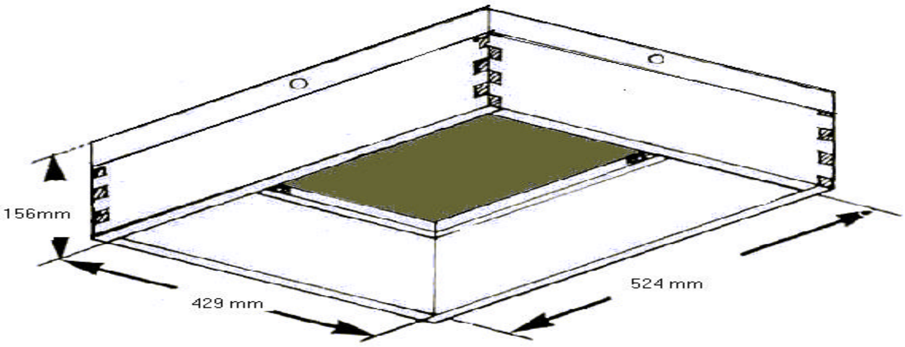


Langstroth Frame

A	19 mm
B	25 mm
C	75 mm
D	35 mm
E	9 mm
F	22 mm
G	27 mm
H	232 mm
I	19 mm
J	8 mm



CROWN BOARD



ROOF

7.3 Top bar Hive /intermediate/ (Kenya Top bar)

7.3.1 Wood used to make Top bar hives shall be well-seasoned, free from checks, decay, insect-holes dead knots, shakes and splits.

Top bar hives can also be made of new lumber scrap lumber, ply wood, particle board reeds, straw, brick clay, bamboo provide that the hive accommodates 30 top bar of 32 mm. Hives made of reeds or straw need to be plastered with cattle during on the inside, then smoked over a fire to cure the inside coating.

7.3.2 A wax starter guide on top bar shall be provided for bees to construct comb centered on the bar.

There are tow ways to make a starter guide

a) A line of melted bees wax shall be poured along the center of the top bar or stick softened wax on to the bar

b) A groove shall be cut in the center of the top bar and insert a starter strip. Attach the strip with softened or melted wax.

7.3.3 The width of the top bar shall be 32 mm

7.3.4 Although the top bars do form a roof for the hive it seems desirable to place some sort of cover over the bars to protect them from the weather.

7.3.5 The length of the hive body shall be 970 mm to accommodate 30 top bar spaced 32mm.

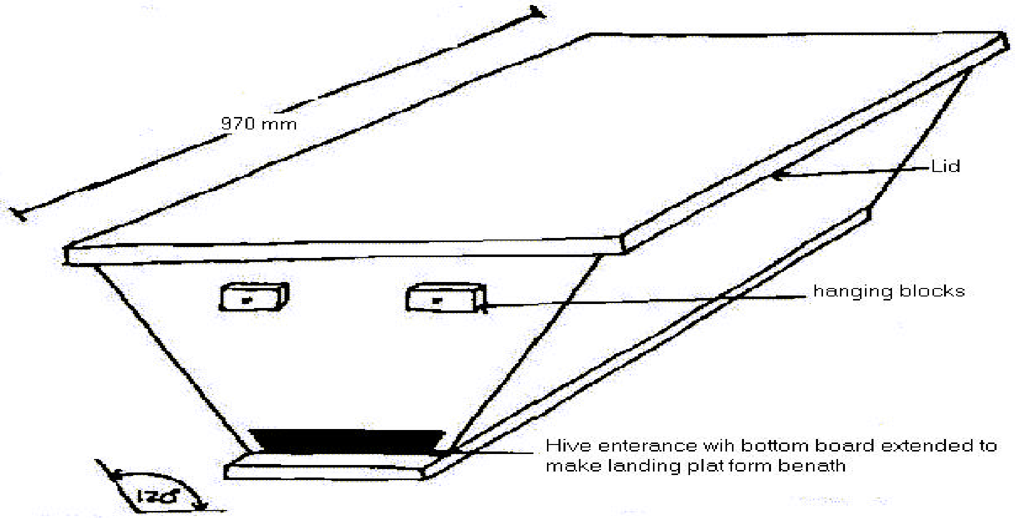
7.3.6 Hive entrance with bottom board shall be extended to make landing platform beneath.

Table III Dimensions of various parts of top bar hives.

		Width in mm	Length in mm
1	Lid	580	970
2	Sides	330	889
3	Bottom	229	965
4	Front	189	272
5	Back	189	433
6	Top bar (upper side)	320	480

7.3.7 All the dimensions of the top bar hive shall be as per the design given based on 19 mm lumber.

Top bar hive Plans


970 mm
Lid
hanging blocks
Hive enterance wih bottom board extended to make landing plat form benath
120

Interior angle of bottom and side is about 120 o

Top bar hive